



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

H.A

| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR    | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|-------------------------|---------------------|------------------|
| 10/743,238  | 12/22/2003  | Paul Mattackal Verghese | 0005.1120US1        | 6972             |
| 25263   | 7590        | 11/06/2006              | EXAMINER            |                  |
| J GRANT HOUSTON<br>AXSUN TECHNOLOGIES INC<br>1 FORTUNE DRIVE<br>BILLERICA, MA 01821 |             |                         | CHANG, AUDREY Y     |                  |
|   |             |                         | ART UNIT            | PAPER NUMBER     |
|   |             |                         | 2872                |                  |

DATE MAILED: 11/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/743,238

Applicant(s)

VERGHESE, PAUL MATTACKAL

Examiner

Audrey Y. Chang

Art Unit

2872

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2,4-11,14 and 17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-11,14 and 17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on **June 5, 2006** has been entered.
2. This Office Action is also in response to applicant's amendment filed on June 5, 2006, which has been entered into the file.
3. By this amendment, the applicant has amended claims 1, 8, 10, 14 and 17, and has canceled claims 3, 12-13 and 15-16.
4. Claims 1-2, 4-11, 14 and 17 remain pending in this application.

### *Response to Amendment*

5. The amendment filed June 5, 2006 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows:

**the newly amended claim 14** recites that "first membrane comprises flexures *enabling* the electrostatic deflection of the first membrane and second membrane comprises flexures *enabling* the *deflection* of the second membrane". The specification **fails** to provide the support for the "flexures" to enable the deflection of the membrane. The deflection is caused by electrostatic force not flexures. Paragraph [0024] of the specification specifically states that the flexures 124 are formed to "control the flexibility of the membrane". To **control flexibility** of the membrane is **not the same** as causing the

Art Unit: 2872

membrane to deflect. The deflection again is caused by the electrostatic force not by the flexibility of the membrane and therefore not by the flexures.

Applicant is required to cancel the new matter in the reply to this Office Action.

### *Drawings*

6. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the feature concerning "an optical port *through* the substrate of at least one of the first membrane device" recited in **claim 8** and **newly added claim 17** must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

7. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters "114-A (and 114-B)" and "122-A (and 122-B)" have **both** been used to designate the substrate. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to

Art Unit: 2872

avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Rejections - 35 USC § 112***

8. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9. **Claim 14 is rejected under 35 U.S.C. 112, first paragraph**, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The reason for rejection based on newly added matters is set forth in the paragraph above.

### ***Claim Objections***

10. **Claims 8 and 17 are objected to because of the following informalities:**

(1). The phrase "an optical port through the substrate of at least one of the first membrane device and the second membrane device" recited in claim 8 and **newly added claim 17** is confusing and indefinite since it is not clear what is considered to be the "optical port *through* the substrate". The specification fails to describe such and the Figures of the specification fail to indicate where are these ports.

Art Unit: 2872

**Appropriate correction is required.**

***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. **Claims 1, 2, 4-11, 14 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Flanders (PN. 6,424,466) in view of the patent issued to Russell et al (PN. 6,384,953).**

**Flanders** teaches a *Fabry-Perot tunable filter* that is comprises of a *first and second membrane devices* having a *first and second membrane* (214, Figure 4) each holds a *mirror coating or structure* (250) with a *reflective surface* (230) and a *first and a second substrate* (210) for supporting the first and second membrane *respectively* and defining a first and second *electrostatic cavities* (216') between the first membrane and the first substrate and the second membrane and the second substrate *respectively* such that the first and second membrane, and therefore the mirror structures, each is capable being deflected with respect to the substrates. Flanders teaches that the first and second mirror structures are opposing to each other wherein a cavity can be formed between the mirror surfaces, (230). The extension of the cavities is achieved by establishing *electrostatic force* between a first and second support or substrate (210) and the first and second membrane respectively, (please see Figure 4 and column 4, line 54 to column 5 line 11). Flanders teaches that the deflection of the membranes and the mirrors may be in opposite direction, (please see column 4), this means the size between the two reflective surfaces (230) can be adjusted or tuned.

This reference has met all the limitations of the claims. Flanders teaches to use a third stable mirror (416) in between the two mirror structures to create *two* Fabry-Perot cavities in this tunable filter instead of creating a *single* cavity between the two movable or deflectable mirror structures. However one skilled in the art who understands the theory and operation principle concerning a Fabry-Perot filter would know the Fabry-Perot cavity is set up or defined between two mirror surfaces wherein by designing the separation size between the mirror surfaces a certain resonance condition can be established so that input light signal having the resonance frequency will be selected. This means if there are three mirror surfaces then two cavities can be defined (and two resonance frequencies can be designed) if there are just two mirror then only a single cavity (and a single resonance frequency) can be established. **Russell et al** in the same field of endeavor teaches explicitly of such single cavity Fabry-Perot tunable filter design wherein two movable mirror structures are disposed as opposing to each other such that a *single cavity* is defined between the movable mirror structure to define *a single cavity tunable filter*. It would then have been obvious to one skilled in the art to apply the teachings to Russell et al to make the tunable Fabry-Perot filter of Flanders *a single cavity one* by simply removing the intermediate mirror so the two mirror structures (250) supported by the two membrane devices defines a single Fabry-Perot cavity between them for the benefit of making the tunable filter applicable in the systems that require only single frequency tuning.

With regard to claim 2, Flanders teaches that spacer (412 and 414) is used between the two first and second membrane devices for controlling the size of the cavity.

With regard to claims 4-6, Flanders teaches that the mirror surface (230) could be curved but it does not teach explicitly that it may also be flat. Russell et al teaches that flat mirrors can also be used to created the Fabry-Perot cavity. It would then have been obvious to one skilled in the art to either use flat or curved mirror surfaces as desired to form the Fabry-Perot cavity for the benefit of making the cavity has the geometric design that suits for specific application requirements.

With regard to claims 7 and 10-11, Flanders teaches that an electrostatic cavity (216') is defined between each of the first and second membrane (214) and its corresponding substrate (210) such that a voltage therefore an electrostatic force is set between the membrane and the substrate to deflect the membrane (please see Figure 4 and column 4, line 54 to column 5 line 11). With regard to claim 11, the drive voltage generator is implicitly included to apply the voltage across the electrostatic cavity and therefore set up the electrostatic force.

With regard to claims 8 and 17, Flanders teaches that the first and second optical ports (240) are through the first and second substrate of support, (210).

With regard to claim 9, Flanders teaches that the reflective layer (230) is a dielectric mirror, (please see column 4, line 23).

With regard to claim 14, these references do not teach explicitly to include flexures on the membranes. However the membranes either implicitly include certain flexures for creating the elasticity and flexibility or it would have been obvious to one skilled in the art to add such for the benefit of making the membranes with more flexibility in moving the mirror structures.

### ***Response to Arguments***

13. Applicant's arguments with respect to newly amended claims 1-2, 4-11, and 14 and newly added claim 17 have been considered but are moot in view of the new ground(s) of rejection.

14. The applicant is respectfully noted that the specification fails to give positive support for having the flexures to “**enable** the deflection”. The deflection of the membrane is caused by the electrostatic force not by the flexibility of the membrane. The flexibility makes the membrane more easily deflected however the flexibility cannot make itself deflected. One skilled in the art would know that a flexible material such as a rubber will have be more easily deflected if an external force is acted on it however it will not make itself deflected.



Art Unit: 2872

15. The petition filed by the applicant on June 5, 2006 has been dismissed. The petition contains the issue concerning the drawing objection. The applicant is respectfully noted that the numerical designations "114-A" and "114-B" and "122-A" and "122-B" are referred to the same parts in the Figures. The petition also contains issue concerning the new matters rejection of claim 14 concerning "the flexures enabling the electrostatic deflection of the ... membrane". This issue is dismissed since claim 14 has been amended.

### *Contact Information*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

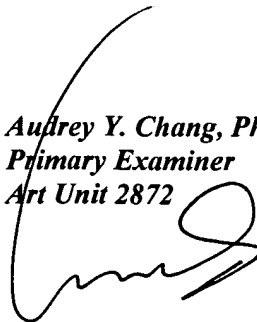
Application/Control Number: 10/743,238

Page 9

Art Unit: 2872

*Audrey Y. Chang, Ph.D.*  
*Primary Examiner*  
*Art Unit 2872*

A. Chang, Ph.D.

A handwritten signature in black ink, appearing to read 'Audrey Y. Chang', is written over the printed name and title.